

# **Winter 2019 Vol. 24 No. 1 LabLink**

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### **Bureau Vision**

**The Bureau of Laboratories is a stronger, more diverse team within an integrated public health system. We utilize advanced technology and innovative leadership to provide comprehensive public health services in our dynamic global community.**

### **Bureau Mission**

**We are dedicated to continuing leadership in providing quality laboratory science for healthier people and communities through partnerships, communication and technical innovation.**





## BOL Explore Lab Science Voted “The Kids’ Choice”

Author: Sandra Lenneman, Explore Lab Science-Outreach

Children of the Michigan Department of Health and Human Service (MDHHS) workers voted the Bureau of Laboratories’ Explore Lab Science exhibit their favorite at the annual “MDHHS Take Your Child to Work Day” held in August, 2018.

The Explore Lab Science Program offered three activities for all participants.



The first activity was the creation of “Ghost Bubbles”. In this experiment, the three states of matter were demonstrated. Dry ice (solid carbon dioxide) was placed in a container of warm water and bubble mix. The fog mist produced was trapped in bubbles using a fill tube. Wearing gloves, participants held very large gas-filled bubbles in their hands that would sink instead of float.

The second activity was “Chemical Traffic Light”. This experiment demonstrated reversible oxidation and the reduction of a solution by mixing three chemicals in a flask. Shaking the flask introduced oxygen into the solution from the air that turned the liquid green. When the chemicals in the flask remained unshaken, oxygen returned to the air and the liquid turned red. When all the oxygen returned to the air, the solution turned yellow. The chemical reaction and change of colors were produced repeatedly, just like a traffic light.



The final activity was “Dry Ice, Ice Cream”. This experiment demonstrated how to make ice cream using crushed dry ice, heavy cream, sugar, and vanilla. When heated, dry ice (frozen carbon dioxide) gas sublimates, or changes from a solid to a gas without going through a liquid phase first. Sublimation removed internal heat from the creamy mixture and released it into the air along with carbon dioxide gas. Heat from the creamy mixture dissipated so quickly that it formed very cold, slightly tangy flavored, carbonated ice cream.



*Explore Lab Science is a K-12 science education program administered by the Bureau of Laboratories. The program offers science demonstrations as requested by schools and a website with fun science activities for K-12 students. The goal of the program is to introduce children to lab science and promote laboratory and public health careers. For more information about the Explore Lab Science Program visit the website at [www.michigan.gov/explorelabscience](http://www.michigan.gov/explorelabscience).*



**Explore Lab Science  
Kids' Choice Trophy**





## Measles and Mumps In Michigan

**Author: Jessica Jenkins, MLS(ASCP)**

Measles and mumps are viral infections that afflicted hundreds of thousands of children each year prior to the development of an effective vaccine. Measles virus causes an acute respiratory illness with cough, inflammation of nasal mucosa, conjunctivitis, fever, and rash. Mumps infection is characterized by swelling in one or both parotid glands, that spreads downward with increased fluid buildup. Mumps patients can also present with fever, loss of appetite, and headache.

Indigenous measles virus was declared eliminated from the United States in 2000. However, measles is still endemic in other parts of the world. International travel and incomplete vaccination contribute to the ongoing presence of measles in Michigan. With 19 confirmed cases, 2018 has had the highest rate of measles infections since 1994. Several of these cases have been linked to travel to Israel and Europe where on-going measles outbreaks are occurring. Continued outbreaks illustrate the importance of full vaccination; two doses of the measles vaccine are 97 percent effective at preventing measles infection, but a single dose may not provide adequate seroprotection.

The frequency of mumps infections has dropped by 99 percent since the introduction of the mumps vaccine in 1967. Outbreaks in the United States still occur sporadically with a few hundred to a couple thousand cases reported on average each year. As recently as October 2018, Michigan saw a small outbreak of mumps in students attending the University of Michigan. To date, there have been 11 confirmed and 26 probable cases of mumps in Michigan in 2018. While mumps may occur in highly vaccinated populations, it will propagate more rapidly and widely in unvaccinated groups. A single dose of the mumps vaccine is approximately 78 percent effective at preventing mumps. Two doses increase vaccine effectiveness to 88 percent.

Testing for measles and mumps at MDHHS Bureau of Laboratories is performed using both molecular and serological methods. Molecular methods are intended to detect measles or mumps virus directly, while serological methods evaluate the immune response to the pathogens. Recently, MDHHS validated a Real-Time RT-PCR Assay for measles. In this assay, RNA is extracted from an oropharyngeal, nasopharyngeal, or throat swab, then reverse transcribed into cDNA. The real-time PCR instrument detects fluorescence from a fluorescent dye that is proportionate to the amount of target nucleic acid present in the sample and produces a qualitative result. Mumps RNA detection is performed by real-time PCR. This allows for the analysis of products as amplification is occurring. Acceptable specimens for mumps PCR testing include oral/ buccal swabs, cerebrospinal fluid, and viral culture. The proper timing of specimen collection for PCR is essential; measles RNA is detectable for up to 3-5 days after rash onset, and mumps RNA is most likely to be detected closest to parotitis onset as the viral load decreases rapidly after that time.

Serological evaluation for measles and mumps consists of IgM testing for acute cases and IgG testing for immune status concerns. Measles and mumps IgM tests are performed on serum using a classic manual enzyme immunoassay (EIA). Results are based on optical density which is evaluated by a spectrophotometer and may be negative, equivocal, or positive. To determine immune status, measles and mumps IgG testing is performed by multiplex flow immunoassay (MIA). This technology allows for the simultaneous detection of multiple analytes. The microspheres are color-coded, magnetic beads coated with an antigen specific to measles, mumps, rubella, or varicella. Serum specimens are added into a reaction vessel and incubated with the antigen coated beads. If the specimen contains antibodies specific for the antigen (because of vaccination or previous infection),

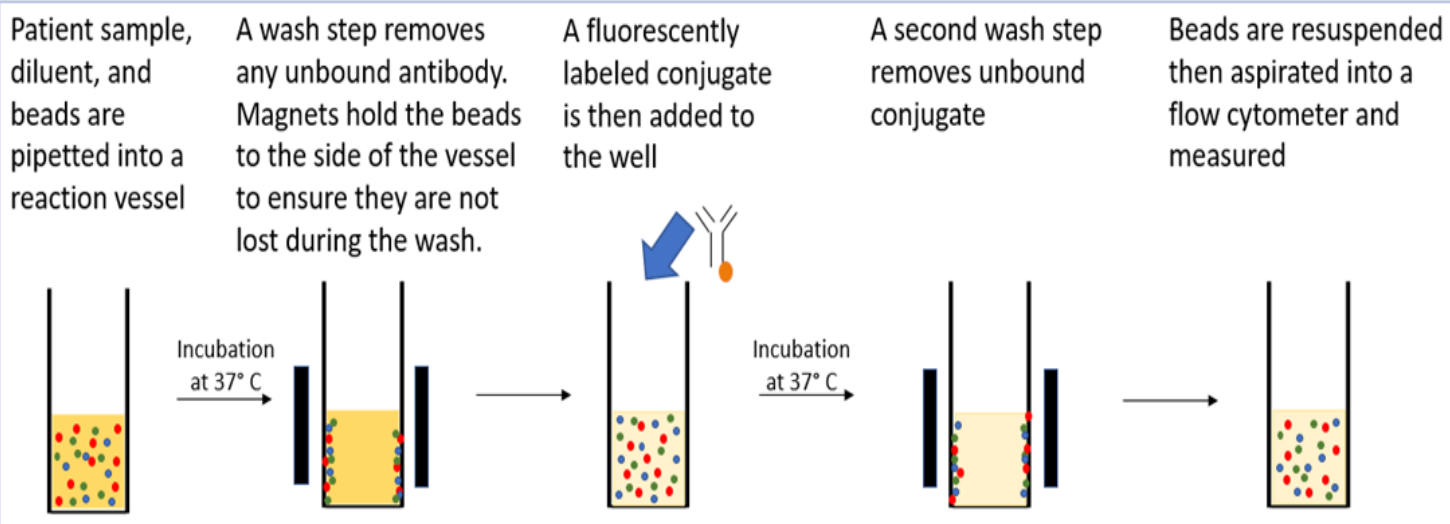
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the antibody will bind to the beads. The beads are then washed, a fluorescently labeled conjugate is added, and the mixture is incubated again. A final wash step removes any unbound conjugate. Once the beads have been fully resuspended, they are passed singly through a flow cytometer that identifies the bead and measures its fluorescence. Possible results are negative, equivocal, or positive. Through the molecular and serological testing at MDHHS, patients can be evaluated for the presence of measles and mumps RNA, IgM antibodies, and IgG antibodies allowing physicians to accurately diagnose or rule out infections with these pathogens.

Measles and mumps IgG testing using the multiplex flow immunoassay (MIA).



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